THE MIAMI COUNTY EXPERIMENT FARM

THIRD ANNUAL REPORT, FOR 1913

OHIO
Agricultural Experiment Station

WOOSTER, OHIO, U. S. A., JUNE, 1914

BULLETIN 274

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[3]In cooperation with Bureau of Plant Industry, U. S. Department of Agriculture.

BULLETIN

OF THE

Ohio Agricultural Experiment Station

NUMBER 274 JUNE, 1914

THE MIAMI COUNTY EXPERIMENT FARM

THIRD ANNUAL REPORT, FOR 1913

The first report on this farm, for the nine months, April to December, 1911, was included in Bulletin 241; the second report, for 1912, was made in Bulletin 256, and the present report covers the calendar year, 1913.

This period of nearly three years has been one of preparation. A new barn, 36 x 70 feet in size, has been built; a considerable amount of tile draining has been done; a new fence has been built along the east side; the lane, which ran diagonally through the farm, has been relocated so as to run parallel with the farm lines; an orchard has been planted, including 96 apple trees set for a fertility test and 60 trees for a variety test, 3 trees of each variety, and a series of lots have been enclosed for an experiment in the production of crops to be eaten off by swine.

PERSONNEL

Mr. Charles McIntire, who had had the general management of this work since the establishment of the experiment farm, resigned in August, 1913, to accept the appointment of Chief Agriculturist of the farms in charge of the Ohio Board of Administration, and Mr. P. C. Herron was appointed superintendent of the Miami county and Paulding county experiment farms for the remainder of the year. Mr. Joseph Brown, who had carried on the actual work of the farm since its organization, resigned at the end of the year to occupy a farm of his own. It is a pleasure to testify to the efficiency, industry and faithfulness with which Messrs. McIntire and Brown have served Miami county and the State during these three years.

CROP ROTATION AND SOIL FERTILITY EXPERIMENTS

Four rotations are in progress in this work, namely:

Rotation I: Corn, oats, wheat, clover.
Rotation II: Corn, soybeans, wheat, clover.
Rotation III: Corn, corn, oats, clover.
Rotation IV: Tobacco, wheat, clover.

The arrangement of plots in the three cereal rotations is shown in Diagram I, and the plan of fertilizing in Tables I and II. The results thus far attained are given in Tables III to VIII.

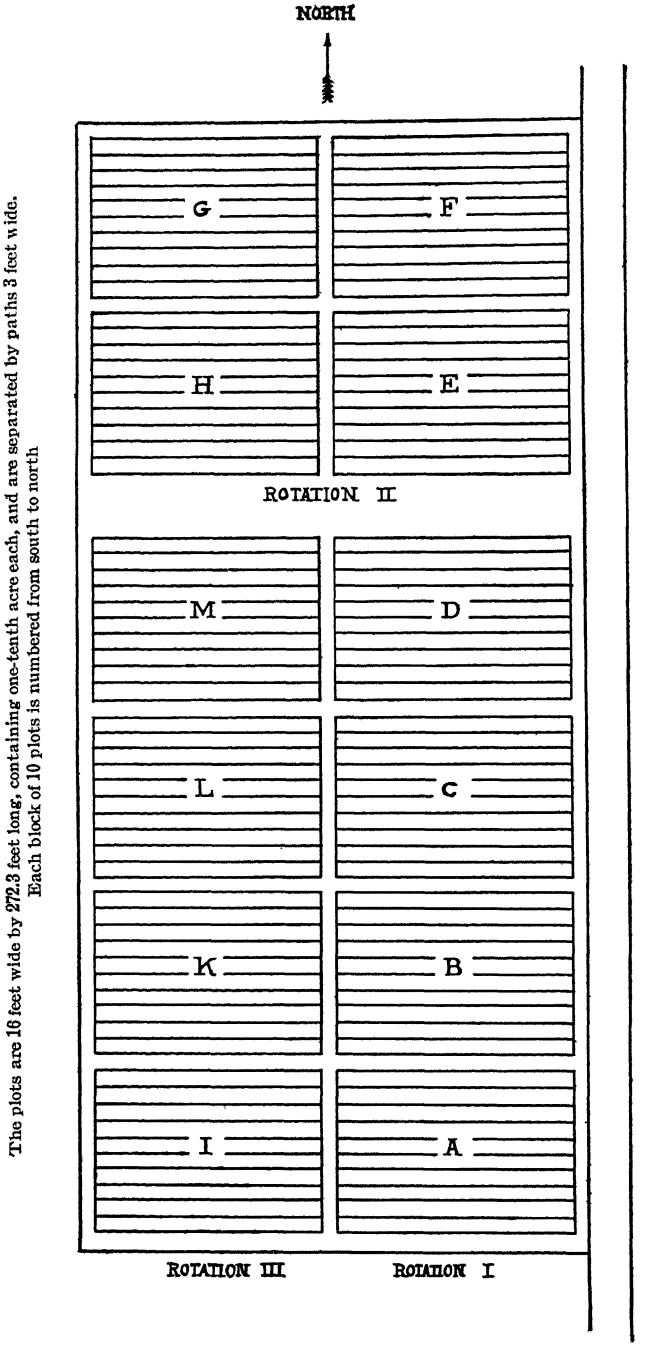

Diagram I. Arrangement of plots in cereal rotations, Miami County Experiment Farm

TABLE I: Plan of fertilizing in cereal rotations, Miami county experiment farm.

Pounds of fertilizing materials per acre for each crop

Plot No.	Acid phosphate	Muriate potash	Nitrate soda	Powdered limestone	Acid phosphate	Muriate potash	Nitrate soda	Acid phosphate	Muriate potash	Nitrate soda
	Rotation I: Corn, oats, wheat, clover									
	On Corn				On Oats			On Wheat		
1	..	..	..	.....	...	..	..	...	..	..
2	200	..	.	.....	100	..	..	200	..	..
3	200	50	..	.....	100	20	..	200	20	..
4	...	..	..	. ....	...	.	..	...	..	..
5	200	50	50	. ...	100	20	30	200	20	80
6	200	50	50	4,000*	100	20	30	200	20	80
7	...	..	..	.....	...	.	.	. .	..	..
8	Manure, 8 tons		..	.....	...	.	..	200	50	50
9	Manure, 8 tons, phosphated			. ....	. .	.	..	200	50	50
10	...	..	..	.....	...	.	..	...	..	..
	Rotation II: Corn, soybeans, wheat, clover									
	On Corn				On Soybeans			On Wheat		
1	...	..	..	..	...	..	..	...	..	..
2	200	..	..	..	100	..	..	200	..	..
3	200	50	..	..	100	20	..	200	20	..
4	...	..	..	..	...	..	..	...	..	..
5	200	50	50	..	100	20	30	200	20	80
6	130	50	20	..	70	20	10	160	20	20
7	...	..	..	..	...	..	..	...	..	..
8	160	20	20	..	100	..	..	170	..	30
9	160	20	20	†	100	..	..	170	..	30
10	...	..	..	..	...	.	..	...	..	..
	Rotation III: Corn, corn, oats, clover									
	On Corn 1st				On Corn 2nd			On Oats		
1	...	..	..	.....	...	..	..	...	..	..
2	200	..	..	.....	200	..	..	100	..	..
3	200	50	..	.....	200	20	..	100	20	..
4	...	..	..	.....	...	..	..	...	..	..
5	200	50	50	.....	200	20	80	100	20	30
6	200	50	50	4,000*	200	20	80	100	20	30
7	...	..	..	.....	...	..	..	...	..	.
8	Manure, 8 tons		..	.....	200	50	50	...	..	..
9	Manure, 8 tons, phosphated*			.....	200	50	50	...	..	..
10	...	..	..	.....	...	..	..	...	..	..

*2,000 pounds in 1912. †Catch crop to follow corn.

Cropping in 1913:

Rotation I	Rotation II	Rotation III
Block D—Corn	Block E—Corn	Block I—Corn 1st
" C—Oats	" F—Soybeans	" M—Corn 2nd
" B—Wheat	" G—Wheat	" L—Oats

TABLE II: Plan of fertilizing in cereal rotations, Miami county experiment farm. Total fertilizing materials for one rotation; constituents and percentage composition

	Total fertilizing materials for one rotation				Fertilizing constituents contained			Percentage composition		
Plot No.	Nitrate soda	Acid phosphate	Muriate potash	Total pounds	Ammonia	Phosphoric acid	Potash	Ammonia	Phosphoric acid	Potash
Rotation I: Corn, oats, wheat, clover										
2	...	500	..	500	..	70	..	.	14	.
3	...	500	90	590	..	70	45	.	12	7
5	160	500	90	750	30	70	45	4	9.5	6
6	160	500	90	750	30	70	45	4	9.5	6
8	...	300	..	300	9.5	28	25	3	9	8
9	...	300	..	300	9.5	28	25	3	9	8
Rotation II: Corn, soybeans, wheat, clover										
2	...	500	..	500	..	70	..	.	14	.
3	...	500	90	590	..	70	45	.	12	7
5	160	500	90	750	30	70	45	4	9.5	6
6	50	360	90	500	9.5	50	45	2	10	9
8	50	430	20	500	9.5	60	10	2	12	3
9	50	430	20	500	9.5	60	10	2	12	2
Rotation III: Corn, corn, oats, clover										
2	...	500	..	500	..	70	..	.	14	.
3	...	500	90	590	..	70	45	.	12	7
5	160	500	90	750	30	70	45	4	9.5	6
6	160	500	90	750	30	70	45	4	9.5	6
8	50	200	50	300	9.5	28	25	3	9	8
9	50	200	50	300	9.5	28	25	3	9	8

In Rotations I and III the only difference in treatment between Plots 5 and 6 is in the lime applied on Plot 6 to the corn crop.

In Rotations II and III the variation between Plots 8 and 9 is in the treatment of the manure on the corn crop.

TABLE III, Part 1: Fertilizers and manure on CORN. Miami County Experiment Farm.

Plot No.	Treatment per acre	1913				3-year average				Plot No.
		Yield per acre		Increase per acre		Yield per acre		Increase per acre		
		Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	
	Rotation I (Corn-oats-wheat-clover) Block D									
1	None	25.29	1,700	....	....	41.62	2,330	.....	...	1
2	Acid phosphate, 200 lbs	41.43	1,600	11.38	*100	51.19	2,433	9.48	167	2
3	Acid phosphate, 200 lbs.; muriate potash, 50 lbs	44.00	2,100	9.19	400	54.02	2,740	12.23	537	3
4	None	39.57	1,700	....	....	41.88	2,140	.....	...	4
5	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.; nitrate soda, 50 lbs	44.86	1,650	1.96	*217	50.98	2,427	8.90	249	5
6	Acid phos., 200 lbs.; mur. potash, 50 lbs.; nit. soda, 50 lbs; powdered limestone, 2,000 lbs.	49.86	2,350	3.62	317	54.12	2,657	11.84	441	6
7	None	49.57	2,200	....	..	42.48	2,253	.....	....	7
8	Untreated manure, 8 tons	64.43	2,450	6.50	*17	56.67	2,430	13.63	233	8
9	Phosphated manure, 8 tons	74.00	3,000	7.72	267	62.48	2,917	18.88	777	9
10	None	74.64	3,000	....	....	44.16	2,083	.....	...	10
	Average unfertilized yield	47.27	2,150	.. .	...	42.53	2,202	.....	...	
	Rotation II (Corn-soybeans-wheat-clover) Block E									
1	None	68.71	3,200	....	...	61.00	2,717	....	...	1
2	Acid phosphate, 200 lbs.	73.57	3,200	8.19	133	66.19	2,780	7.37	174	2
3	Acid phosphate, 200 lbs.; muriate potash, 50 lbs	72.29	3,600	10.25	667	67.57	3,050	10.93	556	3
4	None	58.71	2,800	....	...	54.47	2,383	....	...	4
5	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.; nitrate soda, 50 lbs	58.86	3,150	3.48	433	56.81	2,733	4.16	368	5
6	Acid phosphate, 130 lbs.; muriate potash, 50 lbs.; nitrate soda, 20 lbs	53.29	2,800	1.25	167	55.10	2,580	4.28	232	6
7	None	48.71	2,550	....	...	49.00	2,330	....	...	7
8	Acid phosphate, 160 lbs.; muriate potash, 20 lbs.; nitrate soda, 20 lbs.**	55.29	2,600	9.01	233	56.95	2,580	9.68	323	8
9	Acid phosphate, 160 lbs.; muriate potash, 20 lbs.; nitrate soda, 20 lbs.**	50.43	2,560	6.57	377	51.19	2,660	5.65	477	9
10	None	41.43	2,000	....	...	43.81	2,110	....	...	10
	Average unfertilized yield	54.39	2,637	....	...	52.07	2,385	....	...	

*Decrease. **Plots 8 and 9, Rotation II, are treated alike, except that catch crops follow corn on Plot 9.

TABLE III, Part 2: Fertilizers and manure on CORN. Miami County Experiment Farm.

Plot No.	Treatment per acre	1913 Yield per acre Grain Bus.	1913 Yield per acre Stover Lbs.	1913 Increase per acre Grain Bus.	1913 Increase per acre Stover Lbs.	3-year average Yield per acre Grain Bus.	3-year average Yield per acre Stover Lbs.	3-year average Increase per acre Grain Bus.	3-year average Increase per acre Stover Lbs.	Plot No.
	Rotation III (Corn-corn-wheat-clover) Corn first crop: Block I									
1	None	36.64	1,650	....	...	31.21	1,767	.....	...	1
2	Acid phosphate, 200 lbs.	44.71	2,000	4.83	200	44.71	2,083	10.69	239	2
3	Acid phosphate, 200 lbs.; muriate potash, 50 lbs	52.71	2,150	9.58	200	52.09	2,433	15.26	511	3
4	None	46.37	2,100	....	...	39.65	2,000	... .	...	4
5	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.; nitrate soda, 50 lbs	55.50	2,750	9.37	683	52.41	2,483	12.73	420	5
6	Acid phos., 200 lbs.; mur. potash, 50 lbs.; nit. soda, 50 lbs.; powdered limestone, 2,000 lbs.	53.93	2,200	8.05	167	53.74	2,350	14.03	223	6
7	None	45.64	2,000	....	...	39.74	2,190	.....	...	7
8	Untreated manure, 8 tons.	61.93	2,700	8.10	417	61.74	2,847	17.60	553	8
9	Phosphated manure, 8 tons.	72.71	2,800	10.69	233	62.95	2,850	14.42	453	9
10	None	70.21	2 850	....	...	52.93	2 500	... .	...	10
	Average unfertilized yield	49.71	2 150	....	...	40.88	2 114	.....	...	
	Rotation III (Corn-corn-wheat-clover) Corn second crop: Block M									
1	None	19.14	1,450	....	...	25.52	1,583	... .	...	1
2	Acid phosphate, 200 lbs.	32.64	2,150	12.00	683	43.78	2,277	13.95	569	2
3	Acid phosphate, 200 lbs; muriate potash, 20 lbs.	31.57	1,950	9.43	467	47.67	2,463	13.52	631	3
4	None	23.64	1,500	... .	...	38.45	1,957	... .	.	4
5	Acid phosphate, 200 lbs.; muriate potash, 20 lbs.; nitrate soda; 80 lbs	29.57	1,950	5.43	317	48.00	2,517	10.53	533	5
6	Acid phosphate, 200 lbs.; muriate potash, 20 lbs.; nitrate soda, 80 lbs	31.36	2,450	6.72	683	48.83	2,703	12.34	693	6
7	None	25.14	1,900	.....	...	35.52	2,037	.....	...	7
8	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.; nitrate soda, 50 lbs	32.00	2,700	2.26	483	50.76	2,863	15.75	746	8
9	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.; nitrate soda, 50 lbs	35.80	3,000	1.47	467	50.70	2,907	16.20	708	9
10	None	38.93	2 850	.....	...	33.98	2,280	.....	...	10
	Average unfertilized yield	26.71	1 925	... .	...	33.37	1 965	... .	...	

TABLE IV: Fertilizers and manure on OATS. Miami County Experiment Farm.

Plot No.	Treatment per acre	1913				2-year average				Plot No.
		Yield per acre		Increase per acre		Yield per acre		Increase per acre		
		Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	
	Rotation I (Corn-oats-wheat-clover) Block C									
1	None	47.66	3,200	....	...	51.01	3,145	....	...	1
2	Acid phosphate, 100 lbs.	48.75	3,040	2.81	202	53.94	3,248	2.02	338	2
3	Acid phosphate, 100 lbs.; muriate potash, 20 lbs.	52.50	2,620	8.28	143	60.62	3,047	7.79	371	3
4	None	42.50	2,115	....	...	53.75	2,442	....	...	4
5	Acid phosphate, 100 lbs.; muriate potash, 20 lbs.; nitrate soda, 30 lbs	53.55	2,217	11.62	192	60.63	2,448	8.17	157	5
6	Acid phosphate, 100 lbs.; muriate potash, 20 lbs.; nitrate soda, 30 lbs	52.50	2,720	11.15	785	61.17	2,642	9.92	503	6
7	None	40.78	1,845	....	...	50.00	1,987	....	...	7
8	(Manured on corn)	44.84	2,115	5.93	360	44.84*	2,115*	5.93*	360*	8
9	(Manured on corn)	45.94	2,230	8.91	565	45.94*	2,230*	8.91*	565*	9
10	None	35.16	1,575	....	...	35.16*	1,575*	....	...	10
	Average unfertilized yield	41.53	2,184	....	..	47.48	2,287	....	...	
	Rotation III (Corn-corn-oats-clover) Block L									
1	None	34.37	1,800	.....	..	44.68	2,370	....	...	1
2	Acid phosphate, 100 lbs.	52.35	2,525	12.56	357	51.49	2,565	2.54	**39	2
3	Acid phosphate, 100 lbs.; muriate potash, 20 lbs	58.28	3,185	13.08	648	61.86	3,405	8.64	456	3
4	None	50.62	2,905	.....	...	57.49	3,072	....	...	4
5	Acid phosphate, 100 lbs.; muriate potash, 20 lbs.; nitrate soda, 30 lbs	58.44	3,080	10.06	370	63.05	3,120	7.92	276	5
6	Acid phosphate, 100 lbs.; muriate potash, 20 lbs.; nitrate soda, 30 lbs	58.75	3,145	12.60	630	62.03	3,097	9.27	482	6
7	None	43.91	2,320	.....	...	50.39	2,387	....	...	7
8	(Manured on corn)	50.62	2,730	7.86	532	50.62*	2,730*	7.86*	532*	8
9	(Manured on corn)	53.12	2,875	11.50	798	53.11*	2,875*	11.50*	798*	9
10	None	40.47	1,955	.....	...	40.47	1,955*	....	...	10
	Average unfertilized yield	42.35	2,245	.....	...	48.26	2,446	....	...	

*One year. **Decrease.

TABLE V: Fertilizers on SOYBEANS. Miami County Experiment Farm, 1912 and 1913. Rotation II, Block F

Plot No.	Treatment per acre	Yield per acre			Increase per acre			Plot No.
		1912 Bus.	1913 Bus.	Av. Bus.	1912 Bus.	1913 Bus.	Av. Bus.	
1	None	20.00	18.33	19.16	....	....	....	1
2	Acid phosphate 100 lbs.	21.00	18.08	19.54	0.22	0.80	0.51	2
3	Acid phosphate, 100 lbs. Muriate potash, 20 lbs.	23.67	17.25	20.46	2.12	1.03	1.57	3
4	None	22.33	15.17	18.75	....	....	....	4
5	Acid phosphate, 100 lbs. Muriate potash, 20 lbs. Nitrate soda, 30 lbs.	26.00	14.75	20.37	1.95	*0.06	0.94	5
6	Acid phosphate, 70 lbs. Muriate potash, 20 lbs. Nitrate soda, 10 lbs.	23.50	12.83	18.16	*2.28	*1.61	*1.94	6
7	None	27.50	14.08	20.79	....	....	....	7
8	Acid phosphate, 100 lbs.	29.17	13.58	21.37	2.51	*0.81	0.85	8
9	Acid phosphate, 100 lbs.	27.17	13.83	20.50	1.33	*0.86	0.23	9
10	None	25.00	15.00	20.00	....	....	....	10
	Average unfertilized yield	23.71	15.05	19.68	....	....		

*Decrease.

TABLE VI: Fertilizers and manure on WHEAT. Miami County Experiment Farm, 1913

Plot No.	Treatment	Yield per acre		Increase per acre	
		Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.
	Rotation I (Corn-oats-wheat-clover) Block B				
1	None	29.17	3,625	....	....
2	Acid phosphate, 200 lbs.	33.00	3,920	4.05	440
3	Acid phosphate, 200 lbs.; muriate potash, 20 lbs.	35.67	4,210	6.95	875
4	None	28.50	3,190	....	....
5	Acid phos., 200 lbs.; mur. potash, 20 lbs.; nit. soda, 80 lbs.	30.00	3,550	6.44	877
6	Acid phos., 200 lbs.; mur. potash, 20 lbs.; nit. soda, 80 lbs.[1]	29.33	3,440	10.72	1,283
7	None	13.67	1,640	....	....
8	Acid phos., 200 lbs.; mur. potash, 50 lbs.; nit. soda, 50 lbs.[2]	28.58	3,335	9.02	1,035
9	Acid phos., 200 lbs.; mur. potash, 50 lbs., nit. soda, 50 lbs.[3]	30.58	3,765	5.14	805
10	None	31.33	3,620	....	....
	Average unfertilized yield	25.67	3,039	.	...
	Rotation II (Corn-soybeans-wheat-clover) Block C				
1	None	32.50	3,400	....	....
2	Acid phosphate, 200 lbs.	34.17	4,130	1.64	515
3	Acid phosphate, 200 lbs.; muriate potash, 20 lbs.	38.58	5,035	6.03	1,205
4	None	32.58	4,045	....	....
5	Acid phos., 200 lbs.; mur. potash, 20 lbs.; nit. soda, 80 lbs.	43.50	5,800	12.03	1,822
6	Acid phos., 160 lbs.; mur. potash, 20 lbs.; nit. soda, 20 lbs.	42.50	5,550	12.14	1,638
7	None	29.25	3,845	....	....
8	Acid phos., 170 lbs.; nitrate soda, 30 lbs.	38.08	5,115	10.47	1,568
9	Acid phos., 170 lbs.; nitrate soda, 30 lbs[4]	35.21	4,427	9.24	1,219
10	None	24.33	2,890	....	....
	Average unfertilized yield	29.67	3,545	....	....

[1]Fertilizers and limestone on corn. [2]Untreated manure on corn. [3]Phosphated manure on corn. [4]Catch crop to follow corn.

TABLE VII: Fertilizers and manure on cereal crops grown in rotation, Miami County Experiment Farm: Average value of increase, cost of fertilizers and net gain per acre.

Plot No.	Treatment per acre Total fertilizers and manure for one 4-year rotation	Average increase per acre						Total value of increase	Total cost of fertilizer	Net gain	Plot No.
		Corn		Oats or soybeans		Wheat					
		Grain Bus.	Stover Lbs.	Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.				
	Rotation I (Corn-oats-wheat-clover)										
1	None										1
2	Acid phosphate, 500 lbs.	9.48	167	2.02	338	4.05	440	$ 9.07	$3.80	$5.27	2
3	Acid phosphate, 500 lbs.; muriate potash, 90 lbs	12.23	537	7.79	371	6.95	875	14.84	5.88	8.96	3
4	None										4
5	Acid phosphate, 500 lbs.; muriate potash, 90 lbs.; nitrate soda, 160 lbs.	8.90	249	8.17	157	6.44	877	12.57	10.88	1.69	5
6	Acid phos., 500 lbs.; mur. potash, 90 lbs.; nit. soda, 160 lbs.; ground limestone, 2 tons	11.84	441	9.92	503	10.72	1,283	18.73	14.88	3.85	6
7	None										7
8	Acid phosphate, 200 lbs.; untreated manure, 8 tons	13.63	233	5.93	360	9.02	1,035	16.19	2.28	....	8
9	Acid phosphate, 200 lbs.; phosphated manure, 8 tons	18.88	777	8.91	565	5.14	805	16.87	4.71	....	9
10	None										10
	Rotation II (Corn-soybeans-wheat-clover)										
1	None										1
2	Acid phosphate, 500 lbs.	7.37	174	0.51	....	1.64	515	$ 6.05	$3.80	$2.25	2
3	Acid phosphate, 500 lbs.; muriate potash, 90 lbs	10.93	556	1.57	....	6.03	1,205	14.37	6.07	8.30	3
4	None										4
5	Acid phosphate, 500 lbs.; muriate potash, 90 lbs.; nitrate soda, 160 lbs.	4.16	368	0.94	....	12.03	1,822	15.54	10.87	4.67	5
6	Acid phosphate, 360 lbs.; muriate potash, 90 lbs.; nitrate soda, 50 lbs	4.28	232	*1.94	....	12.14	1,638	9.53	6.31	3.22	6
7	None										7
8	Acid phosphate, 430 lbs.; muriate potash, 20 lbs.; nitrate soda, 50 lbs	9.68	323	0.85	....	10.47	1,588	16.02	5.08	10.94	8
9	Acid phos., 430 lbs.; muriate potash, 20 lbs.; nitrate soda, 50 lbs. Catch crop**	5.65	477	0.23	...	9.24	1,219	12.05	10.08	1.97	9
10	None										10

*Decrease. **A catch crop of 1 bu. rye and 40 lbs. hairy vetch per acre, estimated cost, including labor of seeding, $5.00.

TABLE VII—Continued

Plot No.	Treatment per acre Total fertilizers and manure for one 4-year rotation	Average increase per acre						Total value of increase	Cost of fertilizer	Net gain	Plot No.
		Corn, 1st year		Corn, 2nd year		Oats					
		Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	Grain Bus.	Straw Lbs.				
	Rotation III (Corn-corn-oats-clover)										
1	None										1
2	Acid phosphate, 500 lbs.	10.69	239	13.95	569	2.54	*39	$11.79	$3.80	$7.99	2
3	Acid phosphate, 500 lbs.; muriate potash, 90 lbs	15.26	511	13.52	631	8.64	456	16.27	5.08	11.19	3
4	None										4
5	Acid phosphate, 500 lbs.; muriate potash, 90 lbs.; nitrate soda, 160 lbs.	12.73	420	10.63	533	7.92	276	13.38	10.88	2.50	5
6	Acid phos., 500 lbs.; muriate potash, 90 lbs.; nitrate soda, 160 lbs.; limestone, 2 tons.	14.03	223	12.34	693	9.27	482	15.18	14.88	.30	6
7	None										7
8	Acid phos., 200 lbs.; mur. potash, 50 lbs.; nit. soda, 50 lbs.; manure, 8 tons.	17.60	553	15.75	746	7.86	532	18.18	4.23		8
9	Acid phos., 200 lbs.; mur. potash, 50 lbs.; nit. soda, 50 lbs.; phosphated manure, 8 tons	14.42	453	16.20	708	11.50	798	18.24	6.66		9
10	None										10

*Decrease.

In calculating the increase in these experiments it is assumed that the variations in natural productiveness between different plots are progressive; that is, that if Plots 1 and 4, untreated, yield 30 and 33 bushels respectively, the probability is that if Plots 2 and 3 had been left without treatment their yields would have been 31 and 32 bushels, respectively. Of course this assumption is not always correct, but experience has shown that in general the results arrived at in this way are more trustworthy than would be found by taking the general average of all the unfertilized plots as a basis of comparison.

The difference between the two methods of computation is illustrated by the outcome of the corn crop of 1913. In Block D, Rotation I, for example, the unfertilized yields range from 25.29 bushels on Plot 1 to 74.64 bushels on Plot 10. At first glance it would seem that such an irregularity in yield must completely nullify the experiment, and it certainly would, had there been left only one or two untreated plots, or were we to take the simple average of all the unfertilized plots, or of any two of them, as a guide. This point is brought out by Diagram II, which shows that the variation in unfertilized yield has been comparatively uniform, and that the method of calculation adopted and as represented by the lines A B gives results which may be accepted as at least much nearer the truth than would have been obtained by taking as a basis the general average, represented by the lines C D.

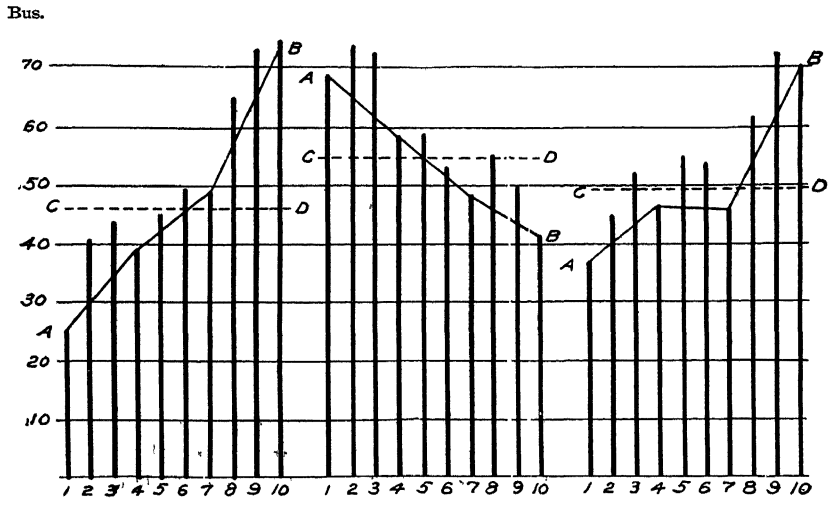

Diagram II: Illustrating method of computing increase.

One of the reasons for the variations in yield shown in this experiment is that the land itself is not as uniform as is desirable for this work, part of it being yellow clay and part black land. It was found so difficult to get enough of either kind of land in one body for this test that it was decided to depend upon the check plots for determining the variation in yield. In this connection it is interesting to compare the two blocks, D and E, which stand on opposite sides of a broad strip of low, black land, which was omitted from the test because of its character. It will be observed that the yield increases rapidly on both sides as this strip of land is approached. Miami County suffered from drought in 1913, and this low land was in better condition as to moisture than the higher land.

Past experience justifies the expectation that as this work progresses under uniform treatment the difference in yield due to superficial soil variations will be modified, and that the effect of the treatment will become more definite.

THE OUTCOME OF THE EXPERIMENTS

It is too early as yet to attempt to draw any but the most general conclusions from these experiments. The first rotation of four years is not yet completed, the clover crop being yet to come, and experience has shown that we may not only expect an increase in the hay crop from the fertilizers and manures which have been applied to the three preceding cereal crops, but that a considerable part of the effect of the treatment will be realized during the next rotation. For example, the average value of the increase of crops from a dressing of acid phosphate on crops grown in a 5-year rotation of corn, oats, wheat, clover and timothy, was $8.50 per acre for the first 5 years at Wooster and $14.12 at Strongsville, and for the second 5 years it was $17.37 at Wooster and $21.60 at Strongsville.

It seems safe to assume, however, that acid phosphate is producing a very profitable increase on all the crops in the three cereal rotations in progress at this farm, and that both total and net gains are increased where the acid phosphate is reenforced by muriate of potash, thus indicating that this land is deficient in both phosphorus and potassium.

When nitrate of soda has been added to the combination of acid phosphate and muriate of potash the calculated increase in the corn crop is found to be smaller in most cases than from those applications in which the nitrate was omitted. In the case of the oats and wheat crops, however, there is usually an increased yield following the addition of nitrate of soda to the fertilizer, although in no case

crease in the three crops thus far grown in this rota-
:ient to offset the additional cost of the fertilizer when
has been added, as shown by the general summary
III. It must be remembered, however, that this sum-
plete, as the clover crop is yet to be heard from.
of the barnyard manure, as used in rotations I and
is found equivalent to about $14 for 8 tons of un-
: at this stage of the work, with the probability that
will bring up the net gain to at least $2.00 per ton of
s far neither the reenforcement of the manure with
nor the supplementing it with a complete fertilizer
ufficient increase to justify the additional cost, but it
ly to attempt to draw final conclusions. Referring
experiments at Wooster and Strongsville, we
crease from 8 tons of yard manure during three
ar periods amounted to $12.02, $21.28, and $35.36 at
o $12.56, $12.62 and $21.22 at Strongsville, the slower
: at Strongsville being due to a less responsive soil
ior quality of manure.

CONCLUSIONS

sent stage of this work it seems evident that the soil
:y will respond very profitably to fertilizers contain-
; and potassium, but that nitrogen should be obtained
saving of barnyard manure and the growing of clover,
.lar crops, rather than by its purchase in commercial
)r nitrate of soda is not only the most effective but the
e of fertilizer nitrogen, and if it fails to produce a
er may be sure that the "ammonia" of the fertilizer
ed at a loss.

NG CORN CONTINUOUSLY ON THE SAME LAND

g the several blocks in this experiment into their
es in the rotation, corn has been grown for three
sion on Block M. The unfertilized yields for the
ear are given below, in comparison with the similar
blocks where the corn followed clover or soybeans:

		Bushels per acre 1911		1913
I	Block C	24.85	Block D	47.27
II	" G	38.14	" E	54.39
III	" L	20.57	" I	49.71
"	" M	22.86	" M	26.71

Corn has been grown continuously and in rotation for 20 years at Wooster, with the following yields on unfertilized land by 5-year periods:

	Bushels per acre			
	1st 5 years	2nd 5 years	3rd 5 years	4th 5 years
Continuous	26.26	23.73	17.20	8.44
Rotation	31.89	30.82	31.04	20.31

The falling off in yield in the rotation corn during the last 5 year period was largely due to injury from white grub. The continuous corn did not suffer from this insect.

EXPERIMENTS WITH TOBACCO

Table VIII gives the results of the experiments with fertilizers and manure on tobacco, and Table IX gives the outcome of a comparison of varieties made under the supervision of A. D. Selby, with the assistance of Henry M. Wachter and True Houser of the Southwestern Test farm at Germantown.

TABLE VIII: Fertilizers and manure on TOBACCO and WHEAT in tobacco-wheat-clover rotation. Miami County Experiment Farm. Yield and increase per acre.

Plot No.	Treatment per acre	Tobacco				Wheat, 1913			
		1913		2-year average		Yield		Increase	
		Yield Lbs.	Increase Lbs.	Yield Lbs.	Increase Lbs.	Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.
1	None	1,240	...	1,590	...	46.42	3,707	....	...
2	Acid phosphate, 480 lbs	1,390	27	1,730	128	39.33	3,195	*5.03	*507
3	Acid phosphate, 480 lbs. ... Muriate potash, 180 lbs. ...	1,630	143	1,820	206	40.75	3,475	*1.56	*222
4	None	1,610	...	1,625	...	40.25	3,692	....	...
5	Acid phosphate, 480 lbs. .. Muriate of potash, 180 lbs. Nitrate of soda, 240 lbs.	1,790	330	1,705	183	43.67	3,665	3.94	224
6	Acid phosphate, 480 lbs. .. Muriate of potash, 180 lbs.. Nitrate of soda, 240 lbs. Ground limestone, 2,000 lbs.	1,770	460	1,870	452	41.33	3,410	2.13	219
7	None	1,160	...	1,315	...	38.67	2,940	....	...
8	Acid phosphate, 240 lbs. .. Muriate of potash, 90 lbs.. Nitrate of soda, 120 lbs.	1,430	330	1,515	265	39.67	3,035	*.11	145
9	Acid phosphate, 400 lbs. .. Stable manure, 10 tons ...	1,440	400	1,452	268	37.33	3,030	*3.56	190
10	None	980	...	1,117	...	42.00	2,790	....	...
	Average unfertilized yield	1,247	...	1,411	...	41.83	3,282	....	. .

*Decrease.

TABLE IX: Comparison of varieties of TOBACCO. Miami County Experiment Farm, 1913

Variety or selection	Yield per acre Lbs.	Increase per acre Lbs.
Zimmer Spanish (check)	1,640	...
81-4150	2,050	413
110-5012-6001	2,510	877
Zimmer Spanish (check)	1,630	...
170-3033	2,070	420
89-5017-No. 5	2,200	530
Zimmer Spanish (check)	1,690	...
307 hmp. 107	2,240	627
199-174-236	2,080	543
Zimmer Spanish (check)	1,460	...
Average Zimmer Spanish	1,605	...

VARIETY TESTING

CORN

In the variety testing of corn it is the aim to test the standard varieties adapted to the county. In 1913, eight varieties were grown, as reported in Table X. The comparative yield, as corrected by the check plots, is given in the third column. The Clarage stands slightly in the lead, with Reid second.

All but two of the varieties grown in 1913 were also grown in 1911. The two-year average yield is given in the fourth column. It will be noted that the Darke County Mammoth used upon the check plots stands first, with the Reid second. The check variety differs from that planted on Plot 10 in that it had been grown locally for two years previous. The latter was not as well acclimated.

TABLE X: Comparison of varieties of CORN. Miami County Experiment Farm.

Plot No.	Variety	1913			2-year average yield Bus.
		Actual yield per acre		Comparative yield Bus.	
		Corn Bus.	Stover Lbs.		
1	Leaming	48.36	2,600	48.61	44.07
2	Check (Darke County Mammoth)	58.14	2,400	.....	.....
3	Clarage	59.57	1,550	59.91	47.69
4	White Cap	55.43	2,950	55.86	.....
5	Check	57.86	3,200	.....	.....
6	Cook's No. 75	57.57	2,850	57.29	48.17
7	Reid (Orcutt)	60.93	2,950	59.84	49.07
8	Check	60.29	3,150	.....	.....
9	Ohio 84 (Early Reid)	48.50	2,500	47.60	40.00
10	Darke County Mammoth (Station)	53.50	2,750	53.60	48.90
11	Check	57.29	3,350	.....	.....
12	Leaming (Scott)	47.43	2,700	48.53	.....
.	Average yield of check plots	58.39	.....	.....	50.49

WHEAT

Two distinct variety tests of wheat were conducted in 1912-13. One set of 12 plots was grown after tobacco. The same variety of wheat—the Velvet Chaff—was used as check in each set. It is of interest to note that the checks average 6.05 bushels higher following tobacco. One other variety was the same in each test, viz: Gypsy Selection 6100, and it gives an increased yield of 7.44 bushels after tobacco. Similar results are secured in northern Ohio in growing wheat after potatoes. Better soil conditions with respect to moisture, nitrates and seed bed probably account for this result.

In the 12-plot test the Rudy, Gypsy Selection 6100 and Nigger lead, with but a small fraction of a bushel difference.

In the tobacco-wheat-clover test three pedigreed selections of wheat which the Experiment Station has developed in its head-row testing work at Wooster, are compared, side by side, with the bulk varieties from which they were selected. In each instance the pedigreed strain exceeds the original, and in the case of Poole Selection 6400 the margin is quite remarkable.

The Miami County wheat yields were exceptionally good in 1913. It should be stated that in 1912 only two varieties survived the winter, viz.; the Turkey Red and the Kharkof. These are unusually hardy Russian varieties which will endure more hardship than our American varieties, but do not usually yield as well in Ohio of a normal season.

The yields at Wooster for the year 1913 are recorded for comparison.

TABLE XI: Comparison of varieties of WHEAT. Actual and comparative yields per acre.

Plot No.	Variety	Miami county			Wooster
		Grain		Straw	
		Actual	Comparative	Actual	Comparative 1913
		Bus.	Bus.	Lbs.	Bus.
1	Nigger	44.67	42.94	5,820	34.26
2	Check (Velvet Chaff)	38.50	.....	4,190	.....
3	Gypsy Selection No. 6100	44.33	43.16	5,710	32.77
4	Mediterranean	39.08	38.47	5,655	28.91
5	Check	36.83	.....	5,165	.....
6	Rudy	42.92	43.22	4,225	33.10
7	Turkey Red	37.92	38.58	4,885	28.83
8	Check	35.75	.....	4,805	.....
9	Fultz Selection No. 5309	40.50	41.44	4,740	35.13
10	Goens	37.08	37.94	5,175	31.85
11	Check	36.00	.....	5,065	.....
12	Valley	41.33	42.10	5 930	29.50
	Average of checks	36.77	.....	4,806	29.55

TABLE XII: Pedigreed wheat test.

Plot No.	Variety	Miami County			Wooster
		Grain		Straw	
		Actual	Comparative	Actual	Comparative 1913
		Bus.	Bus.	Lbs.	Bus.
1	Check (Velvet Chaff)	42.67	.....	6,240	.....
2	Gypsy	46.33	45.37	6,810	29.04
3	Gypsy Selection 6100	52.67	50.60	7,240	32.77
4	Check	46.00	.....	6,890	.....
5	Poole	46.08	44.57	6,135	34.90
6	Poole Selection 6400	55.33	55.49	5,230	40.45
7	Check	41.00	.....	5,680	.....
8	Fultz	40.00	41.60	5,150	31.53
9	Fultz Selection 8106	41.50	42.88	5,160	33.74
10	Check	41.67	.....	5,800	.....
	Average checks	42.82	.....	.....	29.55

OATS

Seven varieties of oats, Oderbrucker barley and emmer (sometimes called speltz) are included in the oats variety test. The Big Four variety leads, both in the 1913 test and in the 2-year average, while the Swedish Select and Silver Mine are close seconds.

Emmer gives a remarkable yield in 1913—much better than in 1912. In comparing emmer with barley and oats it should be stated that the yield is recorded at 32 lbs. per bushel for both oats and emmer, and 48 lbs. for the barley. Emmer is supposed to weigh more than oats, but at Wooster it has tested about the same.

The yield of the same varieties for the last six years at Wooster is included for comparison.

TABLE XIII: Comparison of varieties of OATS. Miami County Experiment Farm.

Variety	Comparative yields			
	1913		2-yr. average Miami	6-yr. average Wooster
	Grain	Straw		
	Bus.	Lbs.	Bus.	Bus.
Ohio 7009 (Sixty Day)	44 14	1,730	59.17	66.52
Ohio 6203 (Siberian)	60.75	4,270	67.95	69.55
Swedish Select	61.12	3,480	69.85	56.70
Big Four	62.99	3,830	70.58	65.50
Silver Mine	61.0	2,705	69.41	65.42
Ohio 6222 (Improved American)	51.87	2,990	.....	66.18
Emmer	61.55	2,930	48.75	18.45
Oderbrucker Barley	36.09	2,770	34.06	18.92
Wideawake—average of 4 check plots	57.114	2 710	64.25	55.74

SOYBEANS

The increasing importance of the soybean to Ohio agriculture, and in particular to the southern half of the state, has suggested the testing of rotations including this crop, as well as different varieties of soybeans in the regular variety tests. Nine varieties

were tested in 1913, with the results recorded in Table XIV, second column. Six of these varieties had been tested in 1912, and the average yield for the two seasons is recorded in column 3.

The New Era cowpeas were grown both years for seed. Their average yield is less than one-half that of soybeans.

For comparison, the 3-year average yields of these varieties, as grown at Wooster, are given.

TABLE XIV: Comparison of varieties of SOYBEANS.

Variety	Color of beans	Yield per acre Miami Co. 1913	Average yield per acre	
			2-year Miami Co.	3-year Wooster
		Bus.	Bus.	Bus.
Ohio 9100 (Ito San)	Yellow	12.81	19.74	21.79
Mongol	Yellow	15.29	27.64	27.58
Chestnut	Yellow	16.93	.....	27.79
Ohio 9035	Brown	16.67	19.83	28.51
Ebony	Black	15.62	21.89	24.42
Ohio 7496	Yellow	20.26	... .	29.25
Ohio 9016	Yellow	17.12	.....	30.64
New Era Cowpeas	Mottled	8.67	8.58	6.77
Medium Green (check) average of 4 plots	Green	15.81	17.90	25.83

SWINE HUSBANDRY

By THE DEPARTMENT OF ANIMAL HUSBANDRY

Pursuant to the plan outlined in Bulletin 241, an experiment has been begun in the raising of hogs on corn and forage crops to be harvested by what is known as the "hogging down" system. Nineteen acres of land has been set aside for this purpose, and divided by wire fences into a blue-grass pasture of 4 acres and 5 lots of three acres each to be cropped in a 5-year rotation as follows:

First year, corn; second year, corn; third year, rape and soy beans; fourth year, rye; fifth year, clover.

The green crops are to be supplemented with grain and tankage when necessary.

Seventy-five pigs were raised in the spring of 1913 and used in pasturing clover and hogging down rye and corn. Owing to the fact that the pigs came rather late in the spring and to a lack of facilities for doing experimental work, no very definite data were secured from the pasturing of the clover or the hogging down of the rye; however, some data were secured from hogging down corn. Two three-acre plots were hogged down with 60 pigs, all the pigs having access to only one plot at a time. The following is a summary of the results secured.

Results secured from hogging down 6 acres of corn with 60 pigs:

Initial weight, September 6, 1912	4564.5 lbs.
Final weight, October 18, 1913[1]	8264.5 lbs.
Total gain, 42 days[1]	3801.0 lbs.
Average daily gain per pig	1.51 lbs.
Feed consumed aside from standing corn: Shelled corn	335.0 lbs.
Feed consumed aside from standing corn: Tankage	754.5 lbs.
Cost of feed consumed aside from standing corn[2]: Shelled corn $3.35, Tankage $18.86	$22.21

Return per acre:

Hogs @ 6c per pound	$34.31
Hogs @ 7c per pound	$40.64
Hogs @ 8c per pound	$46.98

The pigs used averaged 76 pounds in weight when they were turned on the corn and made an average gain of 1.51 pounds daily per pig during the 42 days required to hog down the 6 acres, and, with hogs at 6, 7 and 8 cents per pound live weight, showed a return of $34.31, $40.64 and $46.98 per acre respectively for the standing corn. It was estimated that the corn hogged down would yield about 45 to 50 bushels per acre. In addition to the standing corn, the pigs received three-tenths of a pound of tankage daily per pig, and some shelled corn when they were first turned on the standing corn and again at the close of the hogging down period when the corn on the plot was becoming very scarce. In regard to the net returns per acre as shown above it should be noted that, while charge is made for the tankage and shelled corn consumed by the pigs, yet all *profit* from the project is credited to the standing corn.

It was apparent from the season's work that a rotation furnishing a larger proportion of corn than the five-year rotation of corn, corn, rape and soybeans, rye, and clover, as started last year, would be better suited for this work, and the rotation has been changed to a four-year rotation of corn, corn, wheat or rye, and clover, and one of the five original three-acre plots is to be kept in continuous corn culture with rape and possibly rye seeded in the corn at the last cultivation, the corn to be hogged down each year. In view of the fact that rye soon becomes woody and tough, furnishing palatable green forage for a relatively short time, and that it is not especially well suited for hogging down as was done in 1913, a plan to allow the rye to mature and harvest it, or to use wheat instead of rye, is being considered.

The former four-acre bluegrass plot is being cut down to two acres of bluegrass, the other two acres being devoted to one acre each of alfalfa and rape.

[1]One pig taken out October 13, weight 101 pounds.
[2]Corn 56c per bushel. Tankage $50 per ton.

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